

CLAIMS

What is claimed is:

- 1 1. A land grid array (LGA) package for clamping to an interposer socket on a
2 printed circuit board, the LGA package comprising:
3 a substrate;
4 a die attached to an upper surface of the substrate;
5 a lid attached to an upper surface of the die; and
6 a substrate reinforcement member attached to the upper surface of the
7 substrate and separated from the lid.
- 1 2. The LGA package of claim 1, wherein the substrate reinforcement member
2 comprises a ring attached to the upper surface of the substrate around the periphery of
3 the lid.
- 1 3. The LGA package of claim 1, wherein the substrate reinforcement member
2 comprises at least one longitudinal bar.
- 1 4. The LGA package of claim 1, wherein the substrate reinforcement member
2 comprises one of Invar and SiC.
- 1 5. The LGA package of claim 1, wherein the lid comprises one of AlSiC-9,
2 CuW, and SiC.

1 6. The LGA package of claim 1, wherein a coefficient of thermal expansion of
2 the substrate reinforcement member is substantially equal to a coefficient of thermal
3 expansion of the substrate.

1 7. The LGA package of claim 1, wherein coefficients of thermal expansion of the
2 substrate and the substrate reinforcement member are matched to reduce mechanical
3 stress in the substrate and in an adhesive that attaches the lid to the upper surface of
4 the die.

1 8. The LGA package of claim 1, wherein the substrate reinforcement member is
2 parallel and adjacent to sides of the lid.

1 9. The LGA package of claim 1, wherein the substrate reinforcement member
2 comprises four separate bars.

1 10. The LGA package of claim 1, wherein the substrate reinforcement member has
2 an elongated bar shape.

1 11. In a land grid array (LGA) package comprising a substrate, a die attached to an
2 upper surface of the substrate, and a lid attached to an upper surface of the die, a
3 method for reducing the mechanical stress in the LGA package, the method
4 comprising reinforcing the substrate in the LGA package by attaching a substrate
5 support member to the upper surface of the substrate.

1 12. The method of claim 11, wherein the reinforcing the substrate in the LGA
2 package further comprises matching a coefficient of thermal expansion of the
3 substrate with a coefficient of thermal expansion of the substrate support member.

1 13. The method of claim 11, further comprising providing the substrate support
2 member separated from the lid.

1 14. The method of claim 11, further comprising positioning the substrate support
2 member around both the die and the lid.

1 15. The method of claim 11, further comprising providing the substrate support
2 member as a continuous member extending around all sides of the lid.

1 16. A land grid array (LGA) package comprising:
2 a substrate;
3 a die attached to a surface of the substrate;
4 a lid attached to a surface of the die; and
5 a substrate reinforcement member attached to a surface of the substrate and
6 being adapted to reduce mechanical stress in the substrate.

1 17. The LGA package of claim 16, wherein the substrate reinforcement member
2 has a rectangular cross section.

1 18. The LGA package of claim 16, wherein the lid is adapted to move downwardly
2 to accommodate bending of the substrate.

1 19. The LGA package of claim 16, wherein the substrate reinforcement member
2 extends around a periphery of the die.

1 20. The LGA package of claim 16, wherein the substrate reinforcement member
2 comprises two separate members that are adjacent to and separate from the lid.